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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/767,107

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Ray R. Eshraghi

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INTELLECTUAL PROPERTY / TECHNOLOGY LAW

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RESEARCH TRIANGLE PARK, NC 27709

EXAMINER

CHUO, TONY SHENG HSIANG

ART UNIT

PAPER NUMBER

1745

MAIL DATE

DELIVERY MODE

06/05/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	Application No. 10/767,107	Applicant(s) ESHRAGHI ET AL.	
	Examiner Tony Chuo	Art Unit 1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 01 May 2007.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-14, 16-39, 41-47, 49 and 50 is/are pending in the application.
- 4a) Of the above claim(s) 2-9, 11-14, 26, 31-39 and 41-47 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1, 10, 16-25, 27-30, 49 and 50 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Election/Restrictions***

1. Applicant's election without traverse of Species I(f) in the reply filed on 5/1/07 is acknowledged. The applicant states that the claims readable on Species I(f) are claims 1-14 and 16-30. The examiner disagrees because claims 2-9, 11-14, and 26 do not read on Species I(f). Claims 2-9, 11-14, 26, 31-39, and 41-47 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected Groups II & III, and Species I(a),(b),(c),(d),(e),(g),(h), there being no allowable generic or linking claim.

### ***Response to Amendment***

2. Claims 1-14, 16-39, 41-47, 49, and 50 are currently pending. Claims 15, 40, and 48 have been cancelled. Claims 2-9, 11-14, 26, 31-39, and 41-47 are withdrawn from further consideration as being drawn to non-elected inventions. The previously stated objection to the specification is withdrawn. The previously stated 112 rejection of claim 11 is withdrawn. The amended claims do overcome the previously stated 102 and 103 rejections. However, upon further consideration, claims 1, 10, 16-25, 27-30, and 49-50 are rejected under the following new 102 and 103 rejections.

### ***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

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A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1, 10, and 16 are rejected under 35 U.S.C. 102(b) as being anticipated by Kuespert (US 6228146).

The Kuespert reference discloses a gas recovery device "10" comprising:

- a) a shell "22" comprising a gas collection compartment "26" and a gas storage compartment (not labeled);
- b) a plurality of permeation units "30" that are tubular elements disposed in the shell i) having one or more open ends in fluid communication with the gas collection compartment and ii) extending from the gas collection compartment into the gas storage compartment, wherein each of the permeation unit comprises a tubular wall permeable to a target gas and defining a bore side and a shell side;
- c) an epoxy resin which together with the tubular walls, sealingly isolates the gas collection compartment from the gas storage compartment; and
- d) a carrier material for the target gas, wherein the carrier material is disposed in the gas storage compartment on the shell side of the permeation units (See column 4, lines 5-36 and Figure 2).

It also discloses permeation units that are tubes with outer diameters of about 3mm (See column 6, lines 58-65).

***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1, 10, 16-20, 22-25, 27, and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Amendola et al (US 6534033) in view of Kuespert (US 6228146).

The Amendola reference discloses a hydrogen generation system "100" comprising: a reservoir "120" that is filled with  $\text{NaBH}_4$  solution "140" and a reaction chamber "180" having a hydrogen generation catalyst system "170" (See column 13 line 62 to column 14 line 3 and Figure 9). It also discloses a  $\text{NaBH}_4$  solution that has a concentration ranging from 5 to 25 wt%  $\text{NaBH}_4$  and 1 to 10 wt%  $\text{NaOH}$  (See Figure 1). It also discloses water generated from a hydrogen consuming device such as a fuel cell that is added to the borohydride solution (See column 4, lines 30-48).

However, Amendola et al does not expressly teach a storage and dispensing system comprising: a) housing comprising a gas collection compartment and a gas storage compartment; b) a plurality of microtubular elements disposed in the shell i) having one or more open ends in fluid communication with either the gas collection compartment or the gas storage compartment and ii) extending from the gas collection compartment into the gas storage compartment, wherein each of the microtubular elements comprises a tubular wall permeable to a target gas and defining a bore side and a shell side; c) a seal which together with the tubular walls, sealingly isolates the gas collection compartment from the gas storage compartment; d) a carrier material for the target gas, wherein the carrier material is disposed in the gas storage compartment,

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which may be on either the bore sides or the shell sides of the microtubular elements; carrier material for the target gas that is disposed at the shell sides of the microtubular elements; a seal comprising one or more potted members at or proximate to the one or more open ends of the microtubular elements on the bore sides of the microtubular elements and providing a leak-tight seal, wherein one or more potting members, the tubular walls, and the housing define: at least one liquid compartment for holding the liquid carrier material and at least one hydrogen collection compartment separated from the liquid compartment in a leak-tight manner; and tubular walls of the microtubular elements that comprise a membrane material that is gas-permeable but liquid-impermeable, wherein the membrane material comprises a microporous, hydrophobic polymeric material.

The Kuespert reference discloses a gas recovery device "10" comprising: a) a shell "22" comprising a gas collection compartment "26" and a gas storage compartment (not labeled); b) a plurality of permeation units "30" that are tubular elements disposed in the shell i) having one or more open ends in fluid communication with the gas collection compartment and ii) extending from the gas collection compartment into the gas storage compartment, wherein each of the permeation unit comprises a tubular wall permeable to a target gas and defining a bore side and a shell side; c) an epoxy resin which together with the tubular walls, sealingly isolates the gas collection compartment from the gas storage compartment by potting the ends of tubes "30"; and d) a carrier material is disposed in the gas storage compartment on the shell side of the permeation units (See column 4, lines 5-36 and Figure 2). It also discloses permeation units that are gas permeable, liquid impermeable tubes of expanded

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microporous polytetrafluoroethylene that has outer diameters of about 3 mm (See column 6, lines 58-66).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Amendola hydrogen generation system to include a storage and dispensing system comprising: a) housing comprising a gas collection compartment and a gas storage compartment; b) a plurality of microtubular elements disposed in the shell i) having one or more open ends in fluid communication with either the gas collection compartment or the gas storage compartment and ii) extending from the gas collection compartment into the gas storage compartment, wherein each of the microtubular elements comprises a tubular wall permeable to a target gas and defining a bore side and a shell side; c) a seal which together with the tubular walls, sealingly isolates the gas collection compartment from the gas storage compartment; d) a carrier material for the target gas, wherein the carrier material is disposed in the gas storage compartment, which may be on either the bore sides or the shell sides of the microtubular elements; carrier material for the target gas that is disposed at the shell sides of the microtubular elements; a seal comprising one or more potted members at or proximate to the one or more open ends of the microtubular elements on the bore sides of the microtubular elements and providing a leak-tight seal, wherein one or more potting members, the tubular walls, and the housing define: at least one liquid compartment for holding the liquid carrier material and at least one hydrogen collection compartment separated from the liquid compartment in a leak-tight manner; and tubular walls of the microtubular elements that comprise a membrane material that is gas-permeable but liquid-impermeable, wherein the membrane material

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comprises a microporous, hydrophobic polymeric material in order to utilize a gas recovery device that more efficiently separates gas from a liquid carrier material.

Examiner's note: The Kuespert reference is relevant to the Amendola reference and the applicant's field of endeavor because it solve the same problem of separating gas from a liquid carrier material.

7. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Amendola et al (US 6534033) in view of Kuespert (US 6228146) as applied to claims 1, 10, and 16-18 above, and further in view of Henis et al (US 4230463).

However, Amendola et al as modified by Kuespert does not expressly teach tubular walls of the microtubular elements that comprises a first layer of structural material that is gas and liquid permeable and a second layer that is gas permeable but liquid impermeable. The Henis reference discloses a multicomponent gas separation membrane comprises a first layer "2" that is gas and liquid permeable and a second layer "1" that is gas permeable but liquid impermeable (See Figure 1).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Amendola/Kuespert hydrogen generation system to include tubular walls of the microtubular elements that comprises a first layer of structural material that is gas and liquid permeable and a second layer that is gas permeable but liquid impermeable in order to utilize a membrane that provides high structural strength, toughness, and abrasion and chemical resistances, yet exhibits commercially advantageous flux and selective separation (See column 6 line 66 to column 7 line 2).



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8. Claims 29, 30, 49, and 50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Amendola et al (US 6534033) in view of Kuespert (US 6228146) as applied to claims 1, 10, 16-18, and 22 above, and further in view of Hockaday et al (US 2001/0045364). In addition, Kuespert also discloses gas permeable membranes of microporous substrates of a first gas permeable polymer coated with a second gas permeable polymer (See column 6, lines 52-55).

However, Amendola et al as modified by Kuespert does not expressly teach each of the tubular walls of the microtubular elements that comprises a first layer of a catalyst material, a second layer of a membrane material that is gas permeable but liquid impermeable, and third layer of structural material that is gas and liquid permeable; or tubular wall of each microtubular element that is impregnated with a catalyst material and has a coating of a membrane material that is gas permeable but liquid impermeable on an inner surface. The Hockaday reference discloses production of hydrogen that is initiated by a catalyst coated surface "5" that is attached to a hydrophobic porous membrane "1" (See paragraph [0098]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Amendola/Kuespert hydrogen generation system to include each of the tubular walls of the microtubular elements that comprises a first layer of a catalyst material, a second layer of a membrane material that is gas permeable but liquid impermeable, and third layer of structural material that is gas and liquid permeable; or tubular wall of each microtubular element that is impregnated with a catalyst material and has a coating of a membrane material that is gas permeable but liquid impermeable on an inner surface in order to simplify the hydrogen generation

system by incorporating the catalyst into the tubular walls of the permeation units instead of in an external catalyst chamber.

### ***Response to Arguments***

9. Applicant's arguments, see Remarks, filed 1/17/07, with respect to the rejection(s) of claim(s) 1-30 under 35 USC 102 and 103 have been fully considered and are persuasive. Therefore, the rejections have been withdrawn. However, upon further consideration, new ground(s) of rejection are made in view of Amendola et al, Kuespert, Henis et al, and Hockaday et al.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tony Chuo whose telephone number is (571) 272-0717. The examiner can normally be reached on M-F, 8:30AM to 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic

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Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

TC



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PRIMARY EXAMINER